

Appln. No. 09/890,550
Amendment
Reply to Office Action dated November 27, 2002

Docket No. 2000-22

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REMARKS

The foregoing amendments and these remarks are in response to the Office Action dated November 27, 2002. This amendment is accompanied by a request for retroactive extension of time of three months and authorization to charge the fee of \$930.00 and any deficiencies, or credit any overpayments, to Deposit Account No. 50-0951.

At the time of the Office Action, claims 20-27, 29-40, and 43-46 were pending in the application. Claims 20, 22, 24, and 26 were rejected under 35 U.S.C. §102(a) or, in the alternative, under 35 U.S.C. §103(a). Claims 20, 22, 24, and 26 were rejected under 35 U.S.C. §102(b) or, in the alternative, under 35 U.S.C. §103(a). Claims 23, 25, 27, 29-40, and 43-46 were rejected under 35 U.S.C. §103(a). The rejections are set out in more detail below.

Claims 20-27 and 29-40 have been cancelled and claims 43 and 45 have been amended. New claims 47-49 have been added. Claim 47 is based on the cancelled claim 34.

I. Claim Rejections on Art

A brief summary of the rejected claims, which have been either cancelled or withdrawn, is presented below, followed by a brief summary of the rejected claims, which are currently pending. Claims 20, 22, 24, and 26 were rejected under 35 U.S.C. §102(a) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Japanese Patent Application No. JP 11-217268 ("JP '268"). Claims 20, 22, 24, and 26 were also rejected under 35 U.S.C. §102(a) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Japanese Patent Application No. JP-11-320394 ("JP '394"). Additionally, claims 20, 22, 24, and 26 were rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Japanese Patent Application No. JP-07-033547 ("JP '547"). Claims 20, 22, 24, and 26 were also

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rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over US Patent No. 3,951,587 to Alliegro et al. ("Alliegro").

Claims 29, 31, 33, 35, 37, and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP '394. Additionally, claims 23, 27, 34, and 40 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP'394 in view of US Patent No. 6,475,068 to Jimbo et al. ("Jimbo"). Claims 21, 25, 29, 30, 32, 33, 35, 36, 38, and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Alliegro.

Turning to the rejections directed to the currently pending claims, claims 43-46 were rejected under 35 U.S.C. §103(a) as being unpatentable over Jimbo in view of US Patent No. 4,846,673 to Tsukada ("Tsukada"). Additionally, claims 43 and 46 were rejected under 35 U.S.C. §103(a) as being unpatentable over WO 92/10441 in view of US Patent No. 3,859,399 to Bailey et al. ("Bailey").

Prior to turning to addressing the rejections on art, a brief review of independent claim 43 is appropriate. Claim 43 is directed to a wafer grinder table including a plurality of base materials, each of which is a ceramic-metal composite formed by impregnating metal silicon in opened pores of a porous body made of silicon-containing ceramic. A bonding layer is formed from the metal silicon to bond the base materials. A fluid passage is formed in a bonding interface of the base materials. Impregnating metal silicon in the opened pores of the porous body provides table having a very high thermal conductance that can avoid bending of the base materials. Furthermore, by flowing water through the passage, the heat produced when grinding semiconductor wafers is directly and efficiently released from table, so that the temperature difference in the table is very small and the thermal uniformity and thermal response are improved.

Importantly, because metal silicon is impregnated in the opened pores of the porous body made of silicon-containing ceramic, the table has a very high thermal conductance. Thus, the temperature difference in each of the composite base materials is less than conventional products. As a result, the composite base materials have a very

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high thermal uniformity and thermal response. Further, the production of thermal stress is avoided and the base materials resist bending. Thus, the shape stability of the composite base materials is extremely high. Further, this enables wafers to have larger diameters and high quality.

The table includes the passage which is arranged in the bonding interface of the base materials and through which cooling water, gas or the like can flow. Thus, the heat produced when grinding semiconductor wafers is directly and efficiently released from the table. In addition, fine control of the temperature is enabled. In comparison with a conventional apparatus that arranges a cooling jacket on the table to perform indirect cooling, the temperature difference in the table is very small and the thermal uniformity and thermal response are improved drastically. Thus, in operation, the wafers do not affect the apparatus in an undesirable manner and enlargement of the diameters of the wafers is possible. In addition, since wafers are ground with high accuracy, the quality of the wafers is high (support found on page 38, starting at line 14 to page 39, line 6 of the present application).

Turning to the cited references, Jimbo discloses a wafer holding plate (6) for holding a semiconductor wafer (5) on an adhering surface (6a) using a thermoplastic wax (8). An anchoring groove pattern (10) including a plurality of grooves (9) is formed on the adhering surface (6a). Nevertheless, because the anchoring groove pattern (10) is formed on the adhering surface (6a) of the plate to adhere a wafer, the pattern (10) does not function as a fluid passage (claimed in the present application) to release the frictional heat produced at the table. Instead, the anchoring groove pattern (10) is dimensioned to have grooves with a width that allows the thermoplastic wax (8) to properly anchor to the adhering surface (6a).

Tsukada discloses impregnating metal silicon in opened pores of a porous body. However, Tsukada does not disclose the fluid passage recited by claim 43. Accordingly,

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Jimbo and Tsukada cannot be combined to produce the subject matter recited in claims of the present application.

WO 92/10441 discloses a composite monolithic lap (10) having grooves (13, 14) formed on a surface of the lap (10). Nevertheless, WO 92/10441 does not disclose the fluid passage that is arranged within the table, as recited in the claims of the present application. The grooves (13, 14) do not provide or function as a fluid passage, as recited in the claims of the present application. Furthermore, the lap (10) is not used as a table. In contrast, the lap (10) is used to directly polish a wafer using polishing material provided between the lap (10) and the wafer. Accordingly, the use and composition of the table, as recited in the claims of the present application, is quite different from that of the lap (10).

Bailey discloses reacting molten silicon with a boron carbide to produce a silicon carbide. Nevertheless, Bailey does not disclose the fluid passage, as recited in the claims of the present application. Accordingly, WO 92/10441 and Bailey cannot be combined to produce the subject matter recited in claims of the present application.

Newly added claim 47 is based on cancelled claim 34, which was rejected under 35 U.S.C. §103(a) as being unpatentable over JP'394 in view of Jimbo. JP '394 discloses a table (2) and a wafer holding plate (6) made of a silicon carbide sintered substrate having density of 2.7 g/cm³ or more and thermal conductivity of 30 w/mk or more. Nevertheless, JP '394 does not disclose a table including a bonding layer formed from metal silicon. Furthermore, JP '394 does not disclose a fluid passage formed in a bonding interface of base materials as recited in claim 47 of the present application. Accordingly, JP '394 and Jimbo cannot be combined to produce the subject matter recited in the pending claims.

II. Conclusion

Applicant has made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless,

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Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicant respectfully requests reconsideration and prompt allowance of the pending claims.

Respectfully submitted,

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